

Eelgrass Restoration Project Update

10/16/06

Introduction

The Boston Harbor Eelgrass Restoration Project continued into its second full field season in 2006. Spring 2006 field work began with the assessment of shoot density and expansion of the eelgrass plots and seeded areas planted the previous year. These included SW Long Island (LI S), SE Peddocks Island, and Lower Neck Cove, Weymouth. The Long and Peddocks Island sites looked very healthy with vigorous new growth following winter 2005. However, the Weymouth bed gradually deteriorated since its creation in summer 2005 and was eliminated from future plantings. Based on these observations, we decided to expand the Long Island and Peddocks sites. In addition, the NW Long Island (LI N) site and Portuguese Cove (Peddocks), where 2005 test transplants fared well were expanded and two small plots of about 1500 shoots each were added at Rainsford Island. A total of 25,400 shoots were planted during the 2006 season. The total planted area now encompasses 5.1 acres. All current planting sites are shown in Figure 1.

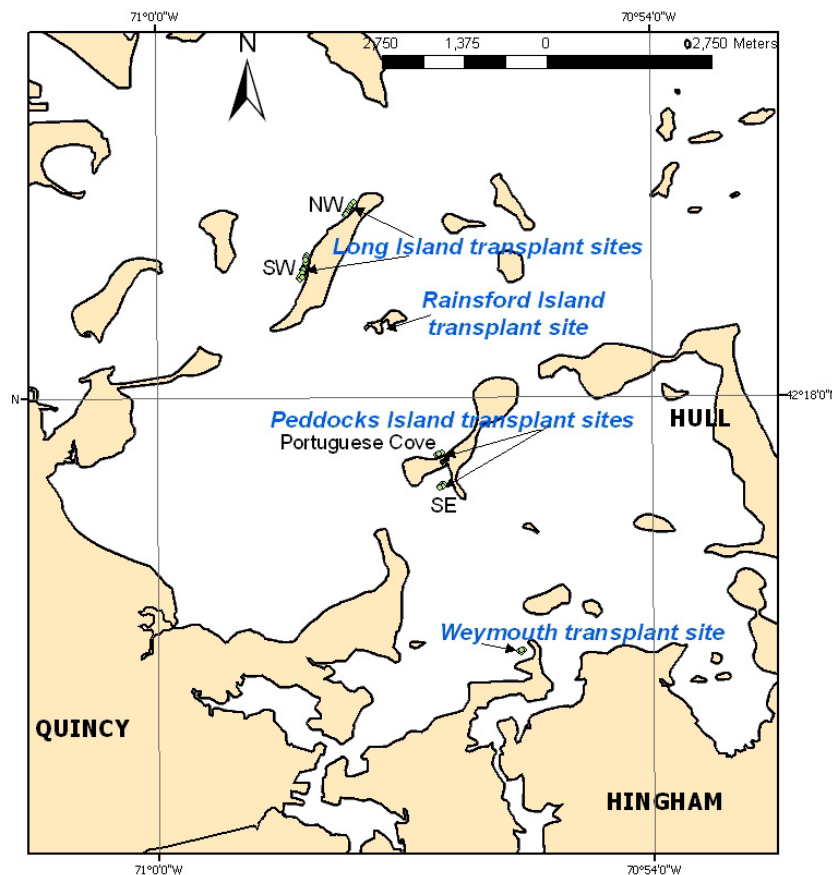


Figure 1. Eelgrass transplant sites in Boston Harbor.

Planting methods

Hand plant vs. frames

Shoots were planted successfully by hand and also with PVC/jute frames to which shoots had been tied. However, the jute attracted macroalgae over the winter. The frames were removed in early spring along with as much algae as possible from the plots. Growth at these plots was subsequently comparable to hand-planted plots. We planted an additional 140 frames during summer 2006, but, while this method works well, it does require considerably more effort; consequently hand-planting has become the mainstay of our transplant operations. Frame planting provides outreach value in that shoreside (non-diver) volunteers can participate and learn about the project.

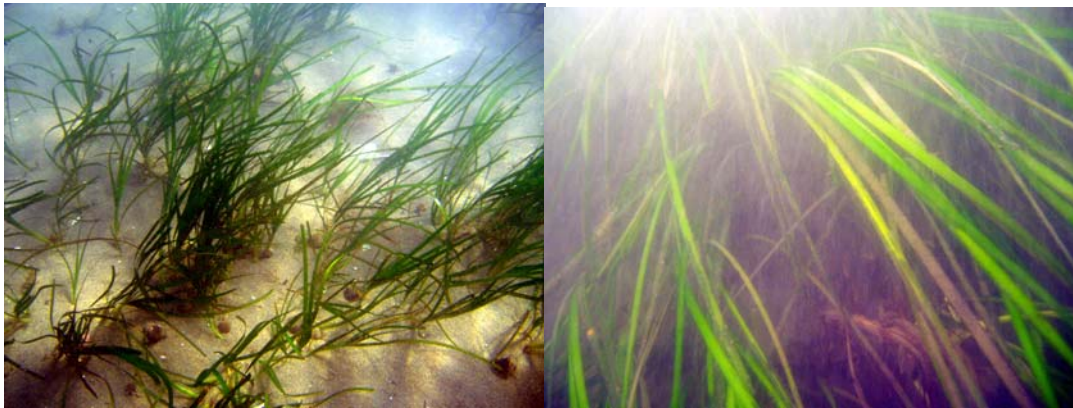


Figure 2. Plots hand-planted in Fall 2005 as they appeared in April (left) and September (right) 2006.

Status of transplanted plots

Plots at LI S expanded an average of 35% in area, 175% in density, by May 2006 (Figure 2). By July density had increased another 48%. Peddocks plots increased an average of 44% in area and 270% in density by May 2006. By July 2006 the checkerboard planting pattern had filled in to the point where it was no longer possible to distinguish the original squares. Density measured in July therefore declined slightly as we did not confine our sampling areas to the original $\frac{1}{4} \text{ m}^2$ squares, but placed sampling quadrats randomly within the larger plot.

In July biological monitoring was conducted to determine whether our transplanted beds provided similar habitat value to naturally occurring beds. To do this, we used several indices to compare areas transplanted in 2005 and 2006, a nearby unvegetated Control site, an existing but declining bed in Boston Harbor (Hull), and a healthy existing bed off Nahant. Visual surveys of fish and invertebrates were conducted and sediment core samples were taken by SCUBA, percent cover of eelgrass and algae was estimated, and biomass and leaf area index (LAI) of eelgrass were measured. Infaunal polychaete communities will be assessed from core samples, as species number and diversity can indicate ecosystem health. Biomass is measured by the dry weight of all of the above ground plant material harvested within a small subsection of a plot. LAI is the average area (length x width x 2) of a sample of eelgrass leaves, and is a measure of 3-

dimensional habitat structure. Benthic infauna have not yet been analyzed, but, based on all other measures, our 2005 transplanted beds compared favorably to the Hull bed, and exceeded even the Nahant bed in epifaunal and demersal species richness (see Figure 3).

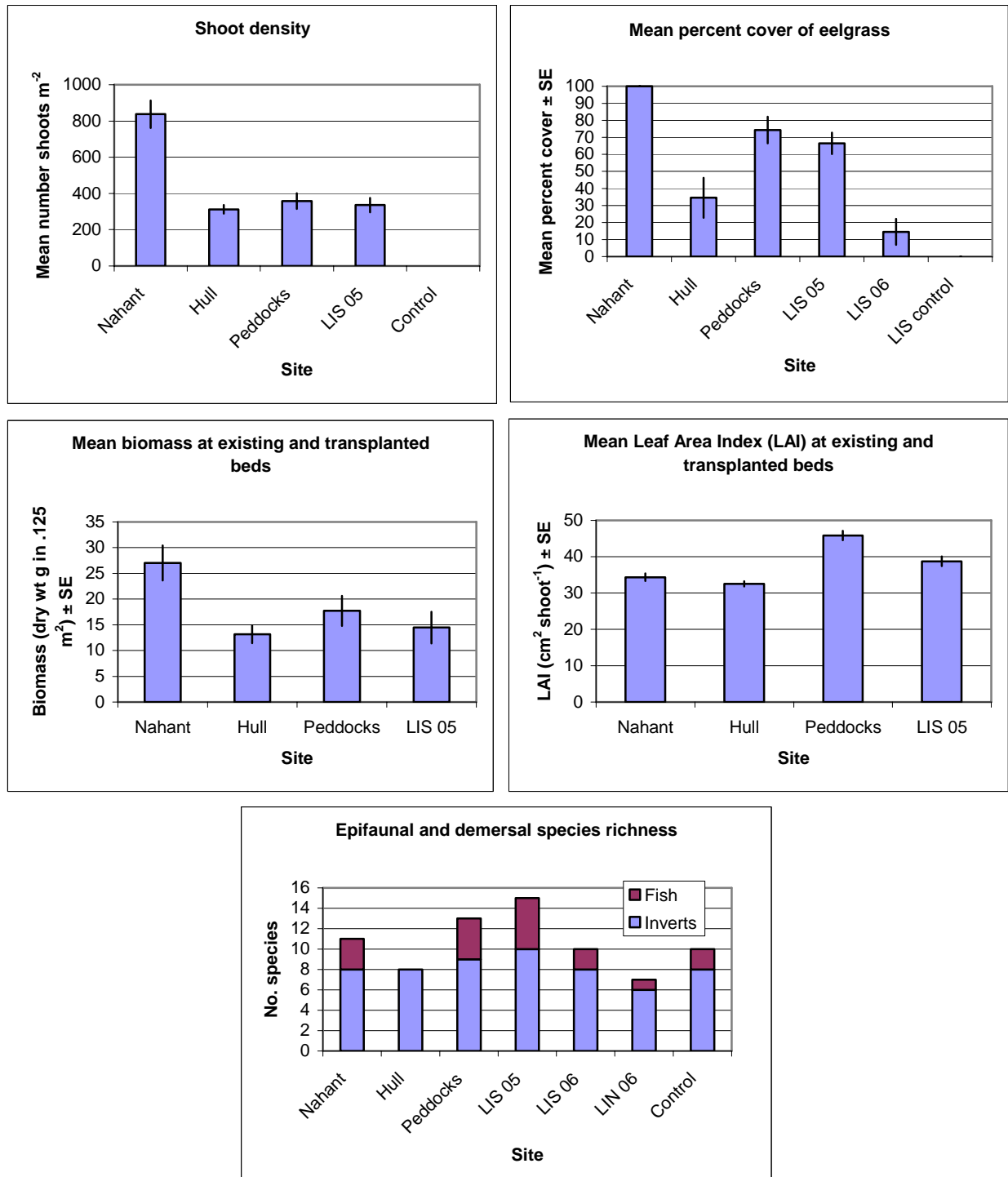


Figure 3. Indices used to evaluate eelgrass beds planted in Boston Harbor.

As one may expect, 2006 transplant sites have not yet achieved the habitat value of a natural bed based on these indices. However, eelgrass beds planted to date have exhibited significant growth and sufficient density to attract a number of organisms (Figure 4).



Figure 4. Some of the animals that have taken up residence in the new eelgrass. Clockwise from top left: spider crab (*Libinia emarginata*), grubby (*Myxocephalus aeneus*), rock crab (*Cancer irroratus*), and juvenile winter flounder (*Pseudopleuronectes americanus*).

Seeds

Seeds planted during fall 2005 at LI S and SE Peddocks had a low initial germination rate (<1%) when first checked in the spring of 2006. However, further germination and spreading continued through the spring, and have generated extensive eelgrass beds. The bed at LI S in particular is thriving, and covers over 175 square meters, a far larger area than our shoot-transplanted plots. In addition, the plots we planted with shoots in fall 2005 produced seed shoots by summer 2006, which will help to expand those beds. The entire area between planted plots at LIS is now dotted with tufts of eelgrass shoots that have apparently been seeded from last year's transplants. We are hopeful that this area will eventually fill in based on the success and spreading observed to date.

This year we tried an original seed planting method to circumvent the time-consuming and expensive step of storing seed shoots in a flow-through sea water tank until the seeds drop. The latter method requires extensive sieving to separate seeds from stems and detritus. The new technique will be described further once it is fully evaluated in spring 2007. If it proves successful, it could provide a far less labor-intensive manual method for vegetating large areas than hand-transplanting shoots. We planted approximately 365,000 seeds using the new method, half at LI S and half at LI N.

Outreach

We had help this year from several corporate groups. At the end of May, 12 volunteers from Clear Forest, Inc., as part of Boston Cares' Corporate Volunteer Day, provided help in re-stringing PVC/jute frames at Long Island. They made quick work of the frames and completed a beach clean-up. In early June, employees of Genzyme, Inc. (Figure 5) and 9 other volunteers from the National Park Service (NPS) tied eelgrass shoots to the frames. With their help and that of two volunteer divers, who assisted with the harvest, we planted 4500 shoots. Later that month, 15 volunteers from State St. Corp. and NPS tied 3650 shoots to frames for planting. Another volunteer citizen diver helped us harvest seed shoots and another one helped with a small transplant. We had 123 hours donated by a total of 43 volunteers.

Other outreach efforts included a talk to a career explorations class at Hull High School and a presentation on a day-long biodiversity event for about 50 Earthwatch Institute employees who cruised Boston Harbor while learning about, and participating in, various research and restoration projects occurring there. *Marine Fisheries* staff also gave a talk to a group of Charlestown High School students who participate in the Courageous Sailing Program in Boston.

We participated in a multi-agency effort to harvest eelgrass from Gloucester Harbor in an area targeted for a CSO pipeline construction. Approximately 7000 shoots were harvested by divers from *Marine Fisheries*, EPA, and Metcalf & Eddy. These were subsequently planted in Boston Harbor by *Marine Fisheries* divers.



Figure 5. Volunteers from Genzyme, Inc. and the National Park Service help tie eelgrass shoots to frames for planting.